

Claims

1. An ultrasound diagnostic apparatus comprising:

a tomogram forming means forming a tomogram of a diagnosis portion of an examinee by transmitting/receiving an ultrasound wave to/from the examinee via an ultrasound probe;

color Doppler image forming means forming a color Doppler image based on a Doppler signal obtained from the diagnosis portion;

image processing means performing image processing on the tomogram and the color Doppler image; and

display means displaying images obtained by the image processing means, the tomogram and the color Doppler image being color displayed on the display means, wherein

the image processing means causes the color Doppler image to be displayed transparently.

2. The ultrasound diagnostic apparatus according to claim 1, wherein the display means displays information composed of the color display and the transparent display.

3. The ultrasound diagnostic apparatus according to claim 1, further comprising selection means selecting one of the color display and the transparent display, wherein the display means displays the information selected by the selection means.

4. The ultrasound diagnostic apparatus according to

claim 1, further comprising a transparency control means controlling a degree of transparency of the color Doppler image of the transparent display.

5. The ultrasound diagnostic apparatus according to claim 4, wherein the transparency control means controls a degree of the transparency based on blood flow information of the color Doppler image.

6. The ultrasound diagnostic apparatus according to claim 4, wherein the transparency control means controls a degree of the transparency based on a variance of a blood flow of the color Doppler image.

7. The ultrasound diagnostic apparatus according to claim 4, wherein the transparency control means sets the transparency of the color Doppler image in such a manner that the transparency is reduced with an increase in the variance of the blood flow.

8. The ultrasound diagnostic apparatus according to claim 4, wherein the transparency control means obtains the variance as a relative value to display the color Doppler image as: an opaque image when the variance is maximum; a transparent image when the variance is null; or a semi-transparent image when the variance is not maximum nor null.

9. The ultrasound diagnostic apparatus according to claim 1, wherein the display means displays a transparent

color bar representing the transparency of the color Doppler image of the color display.

10. The ultrasound diagnostic apparatus according to claim 4, wherein the transparency control means displays the transparency color bar of which transparency is varied depending on the variance.

11. The ultrasound diagnostic apparatus according to claim 4, further comprising luminance/hue control means controlling a hue of the color Doppler image of the color display, wherein the transparency control means and the luminance/hue control means control a luminance, a hue, and a transparency based on the blood flow information to create a three-dimensional color Doppler image.

12. The ultrasound diagnostic apparatus according to claim 11, further comprising:

means for arranging a speed/reflection intensity and variance data of the Doppler signal in each of three-dimensional voxels in accordance with a position of each of planes;

means for deciding a luminance/hue of each of the three-dimensional voxels based on the speed and the variance; and

means for deciding a transparency of each of the three-dimensional voxels based on the variance.

13. The ultrasound diagnostic apparatus according to

claim 11, wherein the display means displays a turbulence portion of the blood flow of the three-dimensional color Doppler image.

14. The ultrasound diagnostic apparatus according to claim 1, wherein the color Doppler image forming means comprises:

a phase comparator outputting a cosine component and a sine component of the Doppler signal;

an MTI filter damping a low frequency component of the cosine component signal and the sine component signal and extracting a high frequency component of the cosine component signal and the sine component signal;

an autocorrelation calculation means calculating an average speed, a variance, and power of the blood flow;

a digital scan converter rearranging in accordance with a television scanning method; and

a color encoder performing colorization corresponding to the speed and the variance.

15. The ultrasound diagnostic apparatus according to claim 1, comprising displaying a luminance/hue color bar representing a color of the color Doppler image of the color display, wherein the luminance/hue color bar changes in color in such a manner that: black is displayed at a portion corresponding to the blood flow speed of 0; the change in the case of a positive direction speed is

displayed as a gradual change from dark red to orange and then to yellow in accordance with the increase in variance; and the change in the case of a negative direction speed is displayed as a gradual change from dark blue to light blue and then to green in accordance with the increase in variance.

16. The ultrasound diagnostic apparatus according to claim 1, wherein the image processing means comprises storage means storing data of a plurality of color Doppler images and reads out the data from the storage means to perform the image processing on the data of speeds, reflection intensities, and variances of the plurality of the color Doppler images.

17. An ultrasound diagnosing method comprising:

a step for transmitting/receiving an ultrasound wave to/from an examinee via an ultrasound probe;

a step for forming a tomogram of a diagnosis portion of the examinee;

a step for forming a color Doppler image based on a Doppler signal obtained from the diagnosis portion;

a step for performing image processing on the tomogram and the color Doppler image; and

a step for displaying the images which underwent the image processing, the tomogram and the color Doppler image being color displayed, wherein

a step for displaying the color Doppler image transparently is further comprised.

18. The ultrasound diagnosing method according to claim 17, further comprising:

a step for measuring a plurality of color Doppler images;

a step for arranging speed/reflection intensity and variance data of the color Doppler images in each of three-dimensional voxels corresponding to each of planes;

a step for deciding color information a luminance/hue of each of three-dimensional voxels based on the speed and the variance;

a step for deciding a transparency of each of the three-dimensional voxels based on the variance; and

a step for performing volume rendering based on parameters decided by the foregoing steps and creating a projection image to be displayed.